

Varian, Inc.
Vacuum Technologies

Industry Leading Vacuum Performance
High Capacity MS-Series Rotary Vane Pumps
& RPS-Series Roots Pumping Systems



Inspiring Excellence™

NOTICE: This document contains references to Varian. Please note that Varian, Inc. is now part of Agilent Technologies. For more information, go to www.agilent.com/chem.

 Agilent Technologies

Industry Leading Vacuum Performance

MS-Series High Capacity Rotary Vane Pumps

More than
20,000
RV pumps
in operation!

Varian MS-Series High Capacity Mono Stage Oil Lubricated Rotary Vane Pumps, from 70 to 630 m³/h

- MS-Series Pumps are robust, easy to install, and are ideal for use in many different applications
- Because of their compact size, MS-Series Pumps can easily replace other pumps of equivalent pumping speed

Shorter Cycle Times

- Smooth continuous operation, from atmospheric to base pressure
- High pumping speed even at low pressure

Industry Leading Vacuum Performance

- Pump design allows lowest base pressure

Easy to Install

- Air cooling
 - cover design optimizes cooling air channels
 - integrated heat exchanger carries excess heat away
- Smaller than pumps of equivalent pumping speed

Highly Reliable

- Highly efficient oil circulation system ensures perfect lubrication and sealing in all critical areas of the pump
- Low noise and vibration

Highly Robust for Stringent Applications

- Steel rotor
- Cast iron stator and cover
- Carbon fiber vanes
- Viton seals
- Gas ballast valve, for pumping high water vapor content
- Anti-suckback isolation inlet valve eliminates oil backstreaming and holds vacuum in case of power loss

Environmentally Friendly

- A demister system limits oil exhaust over the entire range of working pressures



RP-Series Roots Pumps

State-of-the-art, high performance Roots Pumps are ideal for use in demanding industrial applications

More than
15,000
Roots pumps
in operation!

Compact and Easy to Use

- Varian Roots Pumps are simple to use and to install
- Air cooling

High Performance Roots Pumps

- Very high compression ratio
- Varian Roots Pumps can withstand high mechanical loads reducing pumpdown cycles

Clean

Ideal for use in applications demanding the highest levels of cleanliness:

- Special labyrinth seal prevents contamination
- A high capacity trap chamber captures condensation
- Advanced shaft seal technology avoids contamination of the process chamber



RPS-Series Roots Pumping Systems

Varian's RPS Systems combine the ruggedness and reliability of High Capacity MS-Series RVPs with wide range Roots Pumps

Designed for Optimum System Integration

- Ideal combination for roughing down and backing Diffusion Pumps, Turbomolecular Pumps, and other HV pumps
- Optional electronics for continuous operation and monitoring of Vacuum Systems

Wide Product Range offering

- Combining 5 MS-Series RVPs (from 70 to 630 m³/h) and 10 Roots Pumps (from 180 to 4000 m³/h) allows tailored solutions optimizing performance, cost and power consumption

Rugged and Reliable

- Low noise and vibration, thanks to dynamically balanced rotors and precision ground gears
- Long maintenance intervals
- Air Cooling

Typical Applications



ROUGHING AND BACKING HIGH VACUUM PUMPS

The new MS Pumps and RPS Systems are ideally suited for use in combination with Varian Turbo-V and Diffusion pumps or with HV pumps of any other manufacturer



Surface coating systems

The most common application where the RPS are used are coaters of different dimensions, from small ones used in research fields to the very large ones used in industrial applications, including for instance glass coaters or coaters where large automotive or aircraft parts are treated. The ability to offer large RV pumps, up to 630 m³/h and Roots pumps up to 4000 m³/h make the Varian offer in this range particularly interesting and able to satisfy different needs.



Metallurgy and heat treatment

In this field Varian has offered so far a very large number of Diffusion Pumps, with sizes ranging up to 35,000 m³/h. The availability now to provide the full vacuum system up to the atmospheric pressure is rapidly bringing this offer to satisfy most of the users, who are particularly interested in rapid cycle times and the excellent overall reliability of the Varian solution.



Helium leak detection

When large volumes or short cycle are required for a process involving leak detection, typically but not only using helium, the Varian RV pumps alone or in combination with the Roots pumps are an ideal solution to reach the parameters necessary for industrial applications. Varian is well aware of technical aspects of this technology having been a pioneer in leak detection for several decades.



Electron beam welding

EBW equipment requires the use of both High Vacuum Pumps, during generation and running of the welding beam, and Medium Vacuum Pumps for the rest of the process taking place in the chamber where the parts to be welded are positioned. Thanks to the introduction of the new Roots Pumping Systems, today Varian is in a position to offer the entire vacuum system, as a single supply source in this important industry.



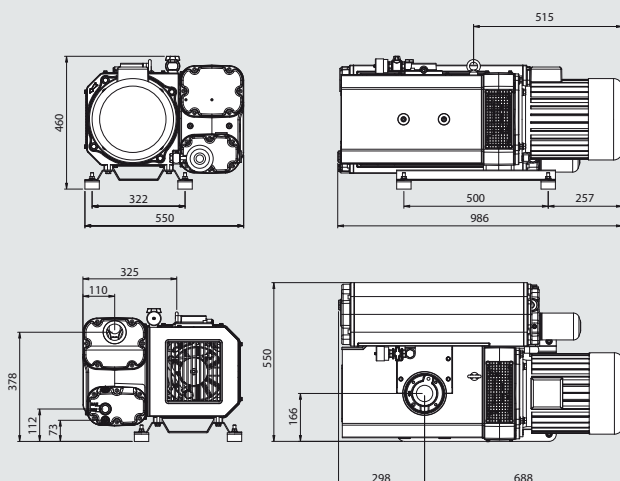
Other industrial applications

Varian RV pumps and Roots Systems are suitable for use in many other applications, including lamps manufacturing, vacuum drying and degassing, gas recovery, packing industry, chemistry and process technology, PET processing, pharmaceutical industry, vacuum distillation, cryogenic vessel evacuation, and others.

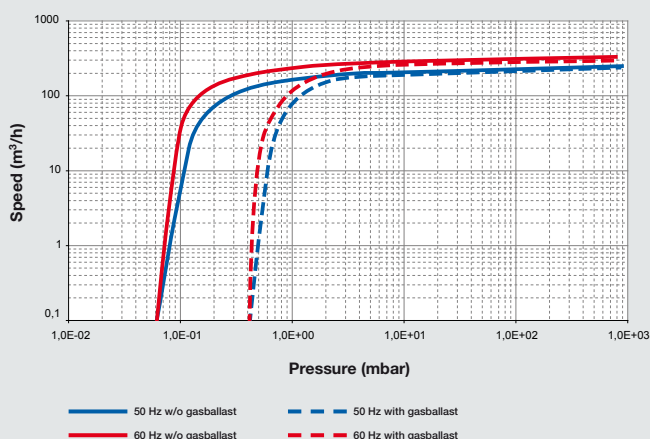
MS-301



OUTLINE DRAWING



SINGLE STAGE PUMP MS-301 - PUMPING SPEED



TECHNICAL SPECIFICATIONS

Pump model	MS-301
Free Air Displacement, 50/60 Hz	290/350 m³/h (170/210 cfm)
Pumping Speed according to Pneurop 50/60 Hz	250 / 290 m³/h (150/170 cfm)
Ultimate partial pressure (with gas ballast closed)	$\leq 8 \times 10^{-2}$ mbar ($\leq 6 \times 10^{-2}$ Torr)
Ultimate total pressure (with gas ballast open)	$\leq 0,7$ mbar ($\leq 0,5$ Torr)
Power (50/60 Hz)	5,5 / 7,5 kW (7,4/10,0 HP)
Power Supply Voltage (50Hz / 60Hz)	230/400 V / 208-230/460 V
Revolutions number (50/60 Hz)	1450 / 1750 RPM
Water vapor tolerance	30/40 mbar (23/30 Torr)
Water vapor capacity	5 / 7 kg/h (5.5 / 7.7 qt/hr)
Noise level*	72 / 76 dB(A)
Inlet Port	Flange DN 63 ISO-K / 2" Gas
Exhaust Port	2" Gas
Oil	type MS-01 / charge 7 liter (7.4 qt)
Working Ambient Temperature Range	+12 +40 °C (+54 +105 F)
Storage Temperature	-15 +70 °C (+5 +158 F)
Dimensions with motor (50/60 Hz)	986 x 550 x 460 mm / 1015 x 550 x 460 mm (38.8 x 21.6 x 18.1 / 40.0 x 21.6 x 18.1 in)
Dimensions without motor	741 x 550 x 460 mm (29.1 x 21.6 x 18.1 in)
Total weight with and without motor	190/141 Kg (420/310 lb)

* measured according to EN ISO 2151 (50/60 Hz)

ORDERING INFORMATION

High Capacity Rotary Vane Pumps	Part Number
MS-301 with motor 5,5 kW, 50 Hz, 230/400 V Inlet Port 2" Gas	949-5001
MS-301 with motor 5,5 kW, 50 Hz, 230/400 V Inlet Flange DN 63 ISO-K	949-5201
MS-301 with motor 7,5 kW, 60 Hz, 208-230/460 V Inlet Port 2" Gas	949-5101
MS-301 with motor 7,5 kW, 60 Hz, 208-230/460 V Inlet Flange DN 63 ISO-K	949-5301
MS-01 Oil Charge for MS-301 (7 liters)	949-5012

Accessories	Part Number
Inlet Air Filter with Polyester Cartridge, for 2" Gas connection	949-5059
Inlet Air Filter with Polyester Cartridge with DN 63 ISO-K Flange	949-5159
Connection Fitting Kit, for 2" Gas connection	949-5065
Connection Fitting Kit, for DN 63 ISO-K Flange connection	949-5165

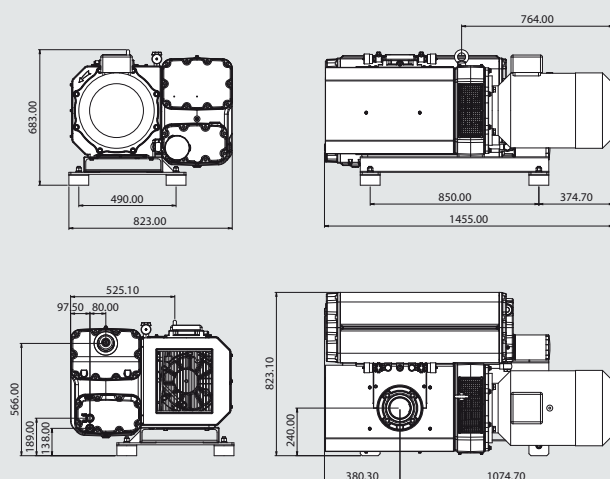
Protective Accessories	Part Number
Pump Thermal Protection Switch	949-5076
Oil Separator Control Pressure Switch	949-5077
MS-301 Oil Level Protection Switch	949-5078

Spare Parts	Part Number
MS-301 Minor Spare Part Kit	949-5020
MS-301 Major Spare Part Kit	949-5021
Oil Filter (Type A)	949-5070
MS-301 Inlet Air Filter Polyester Cartridge	949-5083

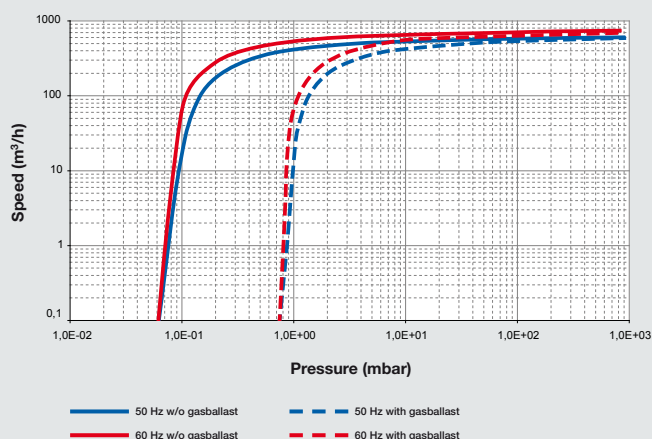
MS-631



OUTLINE DRAWING



SINGLE STAGE PUMP MS-631 - PUMPING SPEED



TECHNICAL SPECIFICATIONS

Pump model	MS-631
Free Air Displacement, 50/60 Hz	660/790 m ³ /h (390/465 cfm)
Pumping Speed according to Pneurop 50/60 Hz	590 / 680 m ³ /h (350/400 cfm)
Ultimate partial pressure (with gas ballast closed)	≤ 8 x 10 ⁻² mbar (≤ 6 x 10 ⁻² Torr)
Ultimate total pressure (with gas ballast open)	≤ 0,7 mbar (≤ 0,5 Torr)
Power (50/60 Hz)	15 / 18,5 kW (20,1/24,8 HP)
Power Supply Voltage (50Hz / 60Hz)	400/690 V / 440-480 V
Revolutions number (50/60 Hz)	820 / 1000 RPM
Water vapor tolerance	30/40 mbar (23/30 Torr)
Water vapor capacity	20/30 kg/h (22.0 / 33.1 qt/hr)
Noise level*	71 / 73 dB(A)
Inlet Port	Flange DN 100 ISO-K / 4" Gas
Exhaust Port	4" Gas
Oil	type MS-01 / charge 22 liter (23.2 qt)
Working Ambient Temperature Range	+12 +40 °C (+54 +105 F)
Storage Temperature	-15 +70 °C (+5 +158 F)
Dimensions with motor (50/60 Hz)	1455x823x683 / 1480x823x683 mm (57.3 x 32.4 x 26.9 / 58.2 x 32.4 x 26.9 in)
Dimensions without motor	1125 x 823 x 683 mm (44.3 x 32.4 x 26.9 in)
Total weight with and without motor	575 / 385 kg (1270/850 lb)

* measured according to EN ISO 2151 (50/60 Hz)

ORDERING INFORMATION

High Capacity Rotary Vane Pumps	Part Number
MS-631 with motor 15,0 kW, 50 Hz, 400/690 V Inlet Port 4" Gas	949-5002
MS-631 with motor 15,0 kW, 50 Hz, 400/690 V Inlet Flange DN 100 ISO-K	949-5202
MS-631 with motor 18,5 kW, 60 Hz, 440-480 V Inlet Port 4" Gas	949-5102
MS-631 with motor 18,5 kW, 60 Hz, 440-480 V Inlet Flange DN 100 ISO-K	949-5302
MS-01 Oil Charge for MS-631 (22 liters)	949-5014

Accessories	Part Number
Inlet Air Filter with Polyester Cartridge, for 4" Gas connection	949-5062
Inlet Air Filter with Polyester Cartridge with DN 100 ISO-K Flange	949-5162
Connection Fitting Kit, for 4" Gas connection	949-5066
Connection Fitting Kit, for DN 100 ISO-K Flange connection	949-5166

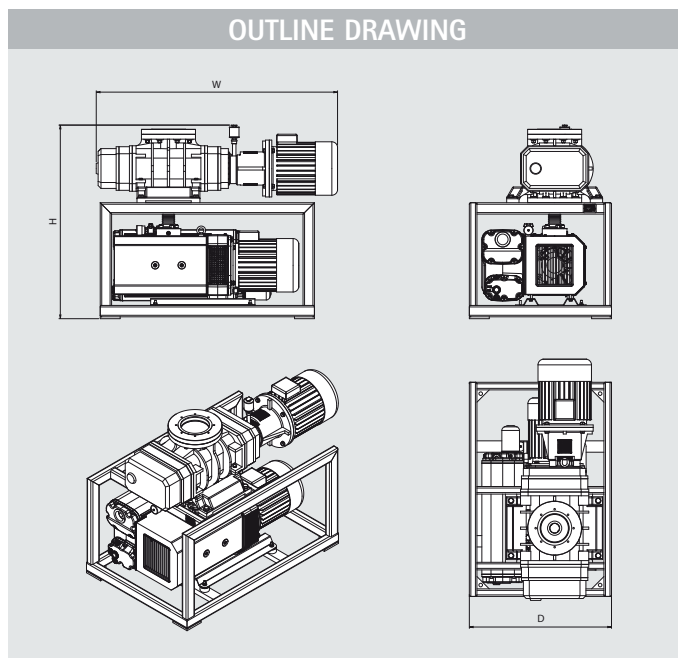
Protective Accessories	Part Number
Pump Thermal Protection Switch	949-5076
Oil Separator Control Pressure Switch	949-5077
MS-631 Oil Level Protection Switch	949-5079

Spare Parts	Part Number
MS-631 Minor Spare Part Kit	949-5087
MS-631 Major Spare Part Kit	949-5088
Oil Filter (Type B)	949-5090
MS-631 Inlet Air Filter Polyester Cartridge	949-5089

RPS-Series Roots Pumping Systems



Photo and Outline Drawing: RPS-1401/301



TECHNICAL SPECIFICATIONS

	RPS-751/301	RPS-1001/301	RPS-1401/301
Nominal pumping speed, 50/60 Hz	750/900 m ³ /h (440/530 cfm)	1000/1200 m ³ /h (590/710 cfm)	1430/1700 m ³ /h (840/1000 cfm)
Ult. total pressure (gas ballast closed)	≤ 7 x 10 ⁻³ mbar (≤ 5 x 10 ⁻³ Torr)	≤ 7 x 10 ⁻³ mbar (≤ 5 x 10 ⁻³ Torr)	≤ 7 x 10 ⁻³ mbar (≤ 5 x 10 ⁻³ Torr)
Ult. total pressure (gas ballast open)	≤ 2 x 10 ⁻² mbar (≤ 1.5 x 10 ⁻² Torr)	≤ 2 x 10 ⁻² mbar (≤ 1.5 x 10 ⁻² Torr)	≤ 2 x 10 ⁻² mbar (≤ 1.5 x 10 ⁻² Torr)
Roots pump start up pressure	≤ 80 mbar (≤ 60 Torr)	≤ 50 mbar (≤ 37.5 Torr)	≤ 30 mbar (≤ 22.5 Torr)
Power (50/60 Hz)	3,0 + 5,5 / 3,6 + 7,5 kW (4.0 + 7.3 / 4.8 + 10.0 HP)	4,0 + 5,5 / 4,8 + 7,5 kW (5.3 + 7.3 / 6.4 + 10.0 HP)	5,5 + 5,5 / 6,3 + 7,5 kW (7.3 + 7.3 / 8.4 + 10.0 HP)
Power Supply Voltage (50Hz)	230/400 V	230/400 V	230/400 V
Power Supply Voltage (60Hz)	208-230 / 460 V	208-230 / 460 V	208-230 / 460 V
Noise level*	74 / 76 dB(A)	74 / 76 dB(A)	74 / 76 dB(A)
Oil charge	1,5 + 7,0 liter (1.6 + 7.4 qt)	1,5 + 7,0 liter (1.6 + 7.4 qt)	1,5 + 7,0 liter (1.6 + 7.4 qt)
Working Ambient Temperature Range	+12 +40 °C (+54 +105 F)	+12 +40 °C (+54 +105 F)	+12 +40 °C (+54 +105 F)
Storage Temperature	-15 +70 °C (+5 +158 F)	-15 +70 °C (+5 +158 F)	-15 +70 °C (+5 +158 F)
Dimensions D x W x H	750 x 1130 x 1175 mm (29.5 x 44.5 x 46.3 in)	750 x 1153 x 1195 mm (29.5 x 45.4 x 47 in)	750 x 1289 x 1195 mm (29.5 x 50.7 x 47 in)
Total weight (50/60 Hz)	450/470 kg (1000/1040 lb)	510 / 530 kg (1130/1170 lb)	570 / 590 kg (1260/1300 lb)
	RPS-2001/631	RPS-3001/631	RPS-4001/631
Nominal pumping speed, 50/60 Hz	2000/2400 m ³ /h (1180/1415 cfm)	2900/3450 m ³ /h (1710/2030 cfm)	3900/4700 m ³ /h (2300/2770 cfm)
Ult. total pressure (gas ballast closed)	≤ 7 x 10 ⁻³ mbar (≤ 5 x 10 ⁻³ Torr)	≤ 7 x 10 ⁻³ mbar (≤ 5 x 10 ⁻³ Torr)	≤ 7 x 10 ⁻³ mbar (≤ 5 x 10 ⁻³ Torr)
Ult. total pressure (gas ballast open)	≤ 2 x 10 ⁻² mbar (≤ 1.5 x 10 ⁻² Torr)	≤ 2 x 10 ⁻² mbar (≤ 1.5 x 10 ⁻² Torr)	≤ 2 x 10 ⁻² mbar (≤ 1.5 x 10 ⁻² Torr)
Roots pump start up pressure	≤ 55 mbar (≤ 41 Torr)	≤ 30 mbar (≤ 22.5 Torr)	≤ 16 mbar (≤ 12 Torr)
Power (50/60 Hz)	7,5 + 15,0 / 8,8 + 18,5 kW (10.0 + 20.1 / 11.8 + 24.8 HP)	11,0 + 15,0 / 12,5 + 18,5 kW (14.7 + 20.1 / 16.7 + 24.8 HP)	11,0 + 15,0 / 12,5 + 18,5 kW (14.7 + 20.1 / 16.7 + 24.8 HP)
Power Supply Voltage (50Hz)	400/690 V	400/690 V	400/690 V
Power Supply Voltage (60Hz)	440-480 V	440-480 V	440-480 V
Noise level*	78 / 80 dB(A)	78 / 80 dB(A)	79 / 81 dB(A)
Oil charge	2,5 + 22,0 liter (2.6 + 23.2 qt)	2,5 + 22,0 liter (2.6 + 23.2 qt)	7,0 + 22,0 liter (7.4 + 23.2 qt)
Working Ambient Temperature Range	+12 +40 °C (+54 +105 F)	+12 +40 °C (+54 +105 F)	+12 +40 °C (+54 +105 F)
Storage Temperature	-15 +70 °C (+5 +158 F)	-15 +70 °C (+5 +158 F)	-15 +70 °C (+5 +158 F)
Dimensions D x W x H	1050 x 1575 [1605 version 60Hz] x 1516 mm (41.3 x 62 [63.2 version 60Hz] x 59.7 in)	1050 x 1615 x 1516 mm (41.3 x 63.6 x 59.7 in)	1050 x 1636 x 1576 mm (41.3 x 64.4 x 62 in)
Total weight (50/60 Hz)	1085 / 1115 kg (2400/2460 lb)	1225 / 1255 kg (2700/2770 lb)	1340 / 1380 kg (2960/3050 lb)

* Measured according to EN ISO 2151 (50/60 Hz)

RPS-Series Roots Pumping Systems

ORDERING INFORMATION

	Part Number
RPS-751/301, with RP-751, MS-301, frame, flex. hose. 50 Hz, 230 / 400 V	949-6008
RPS-751/301, with RP-751, MS-301, frame, flex. hose. 60 Hz, 208-230 / 460 V	949-6106
RPS-1001/301, with RP-1001, MS-301, frame, flex. hose. 50 Hz, 230 / 400 V	949-6001
RPS-1001/301, with RP-1001, MS-301, frame, flex. hose. 60 Hz, 208-230 / 460 V	949-6101
RPS-1401/301, with RP-1401, MS-301, frame, flex. hose. 50 Hz, 230 / 400 V	949-6002
RPS-1401/301, with RP-1401, MS-301, frame, flex. hose. 60 Hz, 208-230 / 460 V	949-6102
RPS-2001/631, with RP-2001, MS-631, frame, flex. hose. 50 Hz, 400/690 V	949-6003
RPS-2001/631, with RP-2001, MS-631, frame, flex. hose. 60 Hz, 440-480 V	949-6103
RPS-3001/631, with RP-3001, MS-631, frame, flex. hose. 50 Hz, 400/690 V	949-6004
RPS-3001/631, with RP-3001, MS-631, frame, flex. hose. 60 Hz, 440-480 V	949-6104
RPS-4001/631, with RP-4001, MS-631, frame, flex. hose. 50 Hz, 400/690 V	949-6005
RPS-4001/631, with RP-4001, MS-631, frame, flex. hose. 60 Hz, 440-480 V	949-6105

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